> closely resembles the decomposition of hydrogen peroxide under the influence of platinum, silver or fibrin; it was hence very natural to imagine an analogous activity in the case of the ferment. (passage translated in Friedmann, 1997, p. 74)

In the same year, Schwann (1836) isolated pepsin, a catalyst in gastric juice that breaks down proteins. Chemists also sought to synthesize substances produced by living organisms. Friedrich Wöhler (1828), for example, synthesized urea from ammonia and cyanic acid. Wöhler's enthusiasm was evident in a letter he wrote to Berzelius: "I can no longer, as it were, hold back my chemical urine; and I have to let out that I can make urea without needing a kidney, whether of man or dog" (quoted in Friedmann, 1997, p. 68).

With the tools of elementary analysis and the concept of catalysis and the example of Wöhler's success in synthesizing urea, some investigators saw the time as ripe to formulate a detailed chemical account of all processes occurring in living organisms. In many respects, the most ambitious of these attempts came from Justus Liebig. After studying in Paris with Thénard and Gay-Lussac, among others, Liebig became a professor at the University of Giessen in 1824 and established one of the most influential laboratories for the study of chemistry. One of his first accomplishments was to perfect an instrument for the elemental analysis of organic substances (Liebig, 1831). A further inspiration for Liebig's thinking was William Prout's (1827) classification of the nutrients required by animals into three classes: saccharine (carbohydrates), oleaginous (fats), and albuminous (proteins). Prout had noted that there were only minor differences in chemical composition between the nutrients animals took in from plants and the compounds that comprised the fluids and solids of their bodies. Liebig drew upon this observation to formulate a central part of the synthetic and highly speculative account of the chemical processes of animals in his *Animal Chemistry* (1842). He proposed that animals incorporated nutrients into their bodies and, as needed, broke them down to their constituents. Because animal tissues were primarily made of protein, he hypothesized they reconstituted them by simply incorporating protein from their diet. When muscle work was required, these proteins were broken down, with waste products excreted. In contrast, he thought animals burned carbohydrates and fats to generate heat. When insufficient oxygen was available for burning, animals converted them to fat and stored them. With these key ideas, Liebig articulated a general scheme, complete with detailed formulae,[25] that described the chemical operations occurring in animals.

[25] These detailed formulae often aroused skepticism. Even though Liebig dedicated *Animal Chemistry* to Jacob Berzelius, Berzelius derided it as "physiological chemistry . . . created at the writing table" (quoted in Fruton, 1972, p. 97).